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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,662	06/15/2001	Kenji Tsukada	Q64982	6948

7590 12/21/2004

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EXAMINER	
VO, ANH T N	

ART UNIT	PAPER NUMBER
2861	

DATE MAILED: 12/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/881,662	TSUKADA ET AL.	
	Examiner	Art Unit	
	Anh t.n Vo	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

NON-FINAL REJECTION

Response to Applicant's Amendment

The rejection over Lichte (US 5,586,085) and Steel (US 5,068,836) is withdrawn in view of the arguments presented in the amendment.

The new prior art cited in the PTO 1449 filed 6/21/04 necessitated a new ground of rejection as below:

Rejections

Claim Rejections - 35 U.S.C. § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-12, 14-15, 26-31 and 33-40 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Hara et al (US Pat. 6,312,115) in view of Kurihara et al (JP10-305590).

Note: The method steps are inherently taught in the apparatus device/limitations in the rejections as below:

Hara et al disclose in Figure 1, 17-18E and 19 an ink cartridge comprising:

- a container body (1) having a plurality of chambers (160-161) and buffers (271-273);
- a pressure reducing container (43) and a vacuum pump (45);
- a charged ink (67);

- wherein a pressure in the ink body (1) is reduced to a pressure lower than an atmosphere pressure by the vacuum pump (45) and the container (1) is charged with the charged ink (67);
- wherein said liquid is ink for an ink jet recording apparatus and said liquid container can be mounted to said inkjet recording apparatus in a removable state; and
- wherein said container body includes a plurality of liquid containing chambers, see Figure 1.

However, Hara et al. do not disclose the piezoelectric device for detecting a consumption condition of the liquid and the device includes a cavity being provided for contacting to the ink.

Kurihara et al teaches in Figure 1 an ink cartridge comprising a piezoelectric detector (3) having elements (4) for forming a cavity contacting to the ink and a diaphragm bonded to a piezoelectric device for correctly detecting the amount of remaining ink even when an ink absorber is set inside the cartridge, see the Abstract. Wherein said piezoelectric detector (3) detects at least an acoustic impedance of said liquid in said container body, and detects said consumption condition of said liquid on the basis of changes in said acoustic impedance, a vibrating portion comes contact to ink via the cavity (4), and said consumption condition is detected based on a signal output from said piezoelectric device, Figure 2. Said signal indicates a residual oscillating state of said vibrating portion based on said consumption condition.

It would have been obvious to a person having skill in the art at the time the invention was made to employ the piezoelectric sensor taught by Kurihara et al in the ink container of Hara et al for the purpose of correctly detecting the amount of remaining ink even when an ink absorber is set inside the cartridge.

With regard to claims 30 and 31, the each piezoelectric device of Kurihara et al is used to detect the remaining ink within one ink container, it would have been obvious to employ a plurality of piezoelectric devices in the plurality of ink containers (160-162) of Hara et al. for detecting the ink remaining within each ink container. Also, it would have been obvious to install the piezoelectric device slightly above the ink feed port of the container body for

accommodate with the physical layout of the ink container so that the entire remaining ink within the ink container would be accurately detected.

With regard to claim 33, a skilled artisan realizes that the size of the piezoelectric device of Kurihara et al should be accommodated with the size of the ink container. For example, a small size detector cannot detect entire remaining ink within a very large size container. Thus, selecting the size of the piezoelectric device, i.e., equal to or less than 1.mm, for the purpose of accommodating with the size of the ink container would have been obvious and is considered to be a matter of a mechanical design expedient for an engineer.

Claims 13 and 16-25 are rejected under 35 USC 103 (a) as being unpatentable over Hara et al (US Pat. 6,312,115) in view of Kurihara et al (JP10-305590) and further in view of Cheng et al (US 4,419,242).

Hara et al in view of Kurihara et al discloses an ink cartridge with all of the limitations of the claimed invention as discussed above but does not disclose that said liquid container has at least one lyophobic part therein which is lyophobic to said liquid in said liquid container; said piezo-electric device has a vibration area which is in contact with said liquid in said container body, said vibration area being lyophobic to said liquid; and said at least one lyophobic part includes an inner side of said cavity.

Nevertheless, Cheng et al teaches in Figure 1 a membrane comprising a lyophobic layer (10) for repelling the penetration of liquid, see lines 30-38, column 3.

It would have been obvious to person having skill in the art at the time the invention was made to incorporate the teaching of lyophobic layer taught by Cheng into the modified cartridge of Hara et al for the purpose of repelling the penetration of ink into the body walls of the cartridge and the piezoelectric device (3) that would prevent the piezoelectric device from damage and the ink container from contamination.

Claim 32 is rejected under 35 USC 103 (a) as being unpatentable over Hara et al (US 6,312,115) in view of Kurihara et al (US JP10-305590) in view of Usui et al (US 6,302,531).

Hara et al in view of Kurihara et al discloses a modified ink cartridge with all of the limitations of the claimed invention as discussed above but does not disclose that the ink container has a check valve.

Usui et al teaches an ink cartridge in Figure 2 an ink cartridge comprising a check vale (6, 7, 7a, 8) for removing bubbles and keeping the negative pressure in the printhead, see lines 60-64, column 1.

It would have been obvious to a person having skill in the art at the time the invention was made to employ the check valve taught by Usui et al in the modified cartridge of Hara et al in view of Kurihara et al for the purpose of removing bubbles and keeping the negative pressure in the printhead.

Response to Applicant's Arguments

The applicant argues that Lichte and Steel fail to teach a piezoelectric device having a cavity connecting inside of the container. The argument is persuasive. However, this limitation is shown as the detector (3) in Figure 1 of Kurihara et al as discussed above.

CONCLUSION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Anh Vo whose telephone number is (571) 2722262. The examiner can normally be reached on Tuesday to Friday from 8:00 A.M.to 6:00 P.M.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 872-9306.

ANH T.N. VO
PRIMARY EXAMINER
December 14, 2004